IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF PENNSYLVANIA

CARNEGIE MELLON UNIVERSITY, Plaintiff, v. MARVELL TECHNOLOGY GROUP, LTD. and MARVELL SEMICONDUCTOR, INC., Defendants.	Civil Action No. 2:09-cv-00290-NBF

MARVELL'S MEMORANDUM IN SUPPORT OF ITS MOTION FOR JUDGMENT AS A MATTER OF LAW ON INVALIDITY

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Pursuant to Federal Rule of Civil Procedure 50(a), Defendants Marvell Technology Group, Ltd. and Marvell Semiconductor, Inc. ("Marvell") respectfully move the Court for entry of judgment as a matter of law on invalidity.

I. INTRODUCTION

Plaintiff Carnegie Mellon University ("CMU") alleges that Marvell infringes claim 4 of U.S. Patent No. 6,201,839 ("the '839 patent") and claim 2 of U.S. Patent No. 6,438,180 ("the '180 patent"). The undisputed evidence presented at trial shows that every element of the asserted claims was known and used in the prior art before CMU's alleged invention, and that the asserted claims are invalid for both anticipation and obviousness. Because there is no legally sufficient basis for a reasonable jury to find that the asserted claims of the '839 and '180 patents are valid, Marvell is entitled to judgment as a matter of law that the asserted claims are both anticipated and obvious under 35 U.S.C. §§ 102 and 103.

II. LEGAL STANDARDS

Judgment as a Matter of Law: Judgment as a matter of law is appropriate where a party has been fully heard and "a reasonable jury would not have a legally sufficient evidentiary basis to find for the party on that issue." *Marten v. Hunt*, 479 F. App'x 436, 439 (3d Cir. 2012) (citing Fed. R. Civ. P. 50(a)); *Stafford Investments, LLC v. Vito*, 375 F. App'x 221, 224 (3d Cir. 2010) (citing *Mosley v. Wilson*, 102 F.3d 85, 89 (3d Cir. 1996)). A "mere scintilla" of evidence is not enough to defeat a motion for judgment as a matter of law. *Sullivan v. County of Allegheny, Pa.*, 112 F. App'x 176, 178 (3d Cir. 2004) ("Federal courts do not follow the rule that a scintilla of evidence is enough.") (citing *Walter v. Holiday Inns, Inc.,* 985 F.2d 1232, 1238 (3d Cir. 1993) (internal quotations omitted)); *see also Ginsburg v. Richardson*, 436 F.2d 1146, 1148 (3d Cir. 1971) (holding that substantial evidence "consists of more than a mere scintilla of

evidence but may be somewhat less than a preponderance") (quoting *Laws v. Celebrezze*, 368 F.2d 640, 642 (4th Cir. 1966)).

Anticipation: "A patent is invalid for anticipation if a single prior art reference discloses each and every limitation of the claimed invention." *Schering Corp. v. Geneva Pharms., Inc.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003); *SmithKline Beecham Corp. v. Apotex Corp.,* 439 F.3d 1312, 1324 (Fed. Cir. 2006).

Obviousness: A patent is invalid as obvious "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). "The combination of familiar elements with known methods is obvious when it provides no functionality except for yielding predictable results." *AdvanceMe Inc. v. RapidPay*, 509 F. Supp. 2d 593, 610 (E.D. Tex. 2007); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415-416 (2007). A patent is obvious when "one of skill in the art could easily view the prior art and make the common sense leap" to the asserted claims. *AdvanceMe*, 509 F. Supp. 2d at 625. "[W]hen a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious." *KSR,* 550 U.S. at 417 (quotation omitted).

While a challenger has the burden of showing invalidity by clear and convincing evidence, that burden is more easily carried where, as here, the challenger relies on prior art that was not presented to or considered by the examiner during prosecution. *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984); *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1050 (Fed. Cir. 1988) (finding that "reliance upon [art not considered by

the PTO] when that art is more pertinent than the art considered by the PTO may facilitate meeting the burden of proving invalidity"); *Roche Palo Alto LLC v. Ranbaxy Labs. Ltd.*, 2009 U.S. Dist. LEXIS 90804, at *140 (D.N.J. Sept. 30, 2009) (finding that "the Federal Circuit has stated that a challenger's burden of showing invalidity by clear and convincing evidence may be more easily carried when relying on prior art that was not considered during patent prosecution") (citing *Uniroyal*, 837 F.2d at 1050).

The undisputed evidence at trial demonstrates that claim 4 of the '839 patent and claim 2 of the '180 patent are anticipated and obvious in light of the prior art. There is no legally sufficient basis for a reasonable jury to find otherwise.

III. THE WORSTELL PATENT ANTICIPATES THE ASSERTED CLAIMS OF THE '839 AND '180 PATENTS

U.S. Patent No. 6,282,251 ("Worstell") is titled a "Modified Viterbi Detector Which Accounts for Correlated Noise." DX-187. The Worstell patent discloses a method for determining branch metric values for branches of a trellis for a Viterbi detector. *Id*. The Worstell patent is assigned to Seagate Technology LLC.

There is no dispute that the Worstell patent constitutes prior art to the patents-in-suit under 35 U.S.C. § 102(e).[1] The Worstell patent was filed in the United States on March 21, 1995 – approximately 14 months before Drs. Kavcic and Moura claim to have conceived of their alleged invention, and over two years before CMU filed its first patent application on their work. This reference was not submitted to or considered by the U.S. Patent Office during prosecution of the patents-in-suit. And as discussed in detail below, the Worstell patent anticipates each and every limitation of asserted claim 4 of the '839 patent and claim 2 of the '180 patent.

[1] It is undisputed that the named inventors of the CMU patents did not conceive their alleged inventions until after the March 21, 1995 filing date of the application that led to the

A. Overview of Worstell

The Worstell patent discloses subject matter within the same technical field as the CMU patents: "The present invention relates to disk drives. More particularly, the present invention relates to a data detector in a disk drive wherein the data detector accounts for correlated noise." DX-187 at 1:4-7. Like the CMU patents, Worstell identifies a problem in prior art Viterbi detectors that ignored correlated noise: "Conventional Viterbi detectors are utilized with branch metrics that do not take into account the correlation of noise in the filter or equalizer." *Id.* at 1:57-61.

To address this problem, the Worstell patent discloses calculating a modified branch metric based on a "plurality" of signal samples, not just one: "The present invention uses a branch metric in a Viterbi detector which is based on a current signal sample, as well as one or more previous signal samples. In this way, the Viterbi detector according to the present invention accounts for correlated noise in the system." *Id.* at 2:3-7.

The Worstell patent also discloses that the modified metric can be "further modified to take into account transition noise." *Id.* at 10:48-50. In describing the modification to account for transition noise (i.e., signal dependent noise), the Worstell patent discloses the use of multiple branch metric functions. "If it is assumed that the ***standard deviation*** of the noise component of each sample is ***greater where there is a transition*** in the signal written to the disc than where there is no transition, then each branch metric can be modified by multiplying the ***metrics*** which correspond to transitions by a fraction ***which depends on the transition noise standard deviation***.") *Id*. at 10:50-56.

Worstell patent.

B. The Patent Office Did Not Consider The Worstell Patent

On May 9, 1997, CMU and its attorneys filed a provisional patent application (Serial No. 60/046,006) with the Patent Office. Both the '839 and '180 patents claim priority to this provisional application. On April 3, 1998, CMU filed a non-provisional patent application (Ser. No. 09/055,033), which claimed priority to the earlier-filed provisional application. This utility application first introduced the claims that eventually issued as the claims of the '839 and '180 patents. There is no indication that the Patent Office ever considered, or that CMU ever disclosed, the Worstell patent during the examination of the patent applications that issued as the '839 and '180 patents.

C. Worstell Discloses Every Limitation of the Claim 4 of '839 Patent

In performing his invalidity analysis, Professor Proakis relied upon Court's claim construction. Trial Tr. (12/17/12) at 66:17-67:8. For example, the Court construed "Signal-dependent noise" to mean "media noise in the readback signal whose noise structure is attributable to a specific sequence of symbols (e.g., written symbols)." *Id.* Dr. Proakis testified that he was applying the Court's claim constructions "in comparing the limitations found in each of the asserted claims to the prior art references." Trial Tr. (12/17/12) at 67:5-7. Based on those constructions, he testified that the Worstell patent disclosed the "selecting" and "applying" steps of the asserted claims. Trial Tr. (12/17/12) at 66:24-68:11.

1. Worstell Discloses A Method of Determining Branch Metric Values For Branches Of A Trellis For A Viterbi-like Detector

Worstell discloses a Viterbi detector, as indicated in the title, "Modified Viterbi Detector which Accounts for Correlated Noise." Trial Tr. (12/17/12) at 64:6-10; D-Demo12-14 (displaying title); DX-187 at 1.

Worstell also discloses a trellis, as shown in Figure 4. D-Demo12-15 (displaying annotated Figure 4); DX-187 at Figure 4; Trial Tr. (12/17/12) at 68:12-69:10.

Worstell discloses determining branch metric values using Equation 20, which is an equation for how branch metric values are computed. Worstell also discloses a further modified branch metric which describes another way that branch metric values can be computed. DX-187 at 9:45-58, 10:48-67; D-Demo12-14; D-Demo 12-15; Trial Tr. (12/17/12) at 60:1-12.

2. Worstell Discloses the Selection of A Branch Metric Function For Each Of The Branches At A Certain Time Index From A Set Of Signal-Dependent Branch Metric Functions

Dr. Proakis testified that the Worstell patent discloses the "selecting" step of claim 4 of the '839 patent. Specifically, he testified that the "transition noise standard deviation" in the "further modified" portion of the Worstell patent is mathematically represented by $1/\sigma^2$. Trial Tr. (12/17/12) at 60:1-61:19, 68:12-69:10. Dr. Proakis then testified that one $1/\sigma^2$ is applied to branches that have no transition, and another $1/\sigma^2$ is applied to branches that have a transition. *Id.* at 67:9-69:10, 94:4-23. Dr. Proakis also testified that what is disclosed in the Worstell patent's "further modified" branch metric is "exactly what is disclosed" in the Zeng and Lee articles referenced in the "Background of the Invention" to the CMU patents, as well as Equation 10 in the CMU patents. Of course, in the face of a strikingly similar Viterbi algorithm in the Worstell patent, CMU dispute(d) whether it disclosed "a set of functions" in accordance with the CMU language, but its admissions about Zeng, Lee, and Equation 10 tell a different story.

As a general matter, Dr. McLaughlin conceded that Dr. Kavcic was not the first person to propose a Viterbi detector that took signal-dependent noise into account. Trial Tr. (12/17/12) at 55:5-15, displayed D-DEMO 12-6, at 3/22/12 McLaughlin Dep. Tr. at 252:10-13. The CMU asserted patents state explicitly that the Zeng and Lee articles (DX-37 and DX-38) took into account signal dependent noise before Drs. Kavcic and Moura. Trial Tr. (12/17/12) at 55:16-25,

displayed D-DEMO 12-7, displayed '839 patent, 1:42-52 (Zeng and Lee articles referenced in CMU patents as having "derived a branch metric computation method for combating the signal-dependent character of media noise"). Notably, Zeng and Lee disclose a conventional Euclidian branch metric function modified to take signal-dependent noise into account by virtue of scaling by $1/\sigma^2$. Trial Tr. (12/17/12) at 56:1-12; D-DEMO 12-8.

At deposition, CMU's expert, Dr. McLaughlin was asked whether the Zeng and Lee articles disclose selecting a branch metric function from a set of functions for each of the branches at a certain time index, and he confirmed that they do. Trial Tr. (12/17/12) at 56:13-24, displayed D-DEMO 12-9, 3/22/12 McLaughlin Dep. Tr. at 267:20-268:3 ("Q. I did. And I'm just trying – again, I will repeat it. They disclose – when I say 'they,' Lee and Zeng disclose selecting a branch metric function from a set of functions for each of the branches at a certain time index; is that correct? A. Yeah. That is correct. That is correct."). Dr. Moura also testified regarding his own equations. He confirmed that Equation 10 in the CMU patents represents a set of functions because of the variance – $1/\sigma^2$. Trial Tr. (12/17/12) at 57:6-19; D-DEMO 12-10.

Dr. McLaughlin admitted that the Worstell patent teaches that transition noise (*i.e.*, signal dependent noise) can depend on the type of transition, and therefore, the value of the noise is going to be different whether there is a transition or whether there is no transition. Trial Tr. (12/17/12) at 69:4-22; displayed D-DEMO 12-16, 3/23/12 McLaughlin Depo. Tr. at 371:5-21, emphasis added.

Dr. McLaughlin also conceded that the standard deviation of the noise for the case where there is a transition could be different from the case where there is a standard deviation

associated with the noise for no transition. Trial Tr. (12/17/12) at 69:23-70:8, displayed D-DEMO 12-17, McLaughlin Depo. (3/23/12) Tr. at 373:15-18, 21-25.

Accordingly, in view of these concessions, there can be no dispute that Worstell discloses multiple branch metric functions that vary according to the parameter σ^2 depending on whether there is a transition, and which functions are applied to a plurality of signal samples. Although CMU maintains that Worstell only discloses a single branch metric function, in view of Dr. McLaughlin's admissions, this position is untenable and no reasonable jury could conclude otherwise.

3. Worstell Discloses The Application of Each Of Said Selected Functions To A Plurality Of Signal Samples To Determine The Metric Value Corresponding To The Branch For Which The Applied Branch Metric Function Was Selected, Wherein Each Sample Corresponds To A Different Sampling Time Instant.

Claim 4 requires that the detector "apply[]" selected branch metric functions to a "***plurality*** of signal samples ***to determine the [branch] metric value***" P-001 at 14:10-19.

The prior art Worstell patent describes a branch metric function (Equation 20) that accounts for correlated noise by including a plurality of signal samples:

> Rewritten in the same terms as the conventional branch metric set out Equations 1 and 2 above, the new branch metric of Equation 19 can be described as follows:
>
> $$B_{b,\mathrm{nt}} = X_{b,nt}^2 - 2X_{b,nt}\sum_{i=1}^{L} X_{b,(n-i)t}W_i$$ Equation 20
>
> where $B_{b,\,nt}$ is the branch metric for branch b at time nt;
> $X_{b,\,nt}$ is the noise and equalization error at time nt for branch b;
> W_i is the ith tap weight of FIR filter **22**;
> L is the number of tap weights beyond the center weight.
> The new branch metric can also be simplified for particular target responses. For example, the correlation of the noise

DX-187 at 9:45-60.

CMU does not dispute that Worstell takes correlated noise into account – and that Drs. Kavcic and Moura were not the first to take correlated noise into account in a modified Viterbi branch metric. Trial Tr. (12/17/12) at 58:18-25; *see also* D-DEMO 12-11: "Q. Was Dr. Kavcic the first person to propose a Viterbi detector that took correlated noise into account? A. I don't believe so." Of course, it could not, as the title of Worstell is "Modified Viterbi Detector Which Accounts for Correlated Noise." DX-187. Rather, CMU contends that Worstell only discloses a single branch metric function. As explained above, in view of numerous admissions by Dr. McLaughlin, CMU's position is untenable.

Claim 4 further requires that "each sample corresponds to a different sampling time instant." Worstell discloses a plurality of time samples at different time instants because there are multiple samples $X_{b,nt}$ with different time indices in equation 20. DX-187 at 9:45-60; D-Demo12-14. As explained by Professor Proakis, $X_{b,nt}$ is a sample at the current time instant while $X_{b,(n-i)t}$ is at a previous time instant. Trial Tr. (12/17/12) at 59:16-25.

D. Worstell Discloses Every Limitation of the Claim 2 of '180 Patent

In performing his invalidity analysis, Professor Proakis relied upon Court's claim construction. Trial Tr. (12/17/12) at 66:17-67:8. For example, the Court construed "Signal-dependent noise" to mean "media noise in the readback signal whose noise structure is attributable to a specific sequence of symbols (*e.g.*, written symbols)." *Id.*

Because Claim 2 is dependent on Claim 1 of the '180 Patent, all of the limitations in Claim 1 are required for Claim 2.

1. Worstell Discloses A Method of Determining Branch Metric Values For Branches Of A Trellis For A Viterbi-like Detector

See section III. C. 1.

2. Worstell Discloses Receiving A Plurality Of Time Variant Signal Samples, The Signal Samples Having One Of Signal-Dependent Noise, Correlated Noise, And Both Signal Dependent And Correlated Noise Associated Therewith

Worstell discloses receiving a plurality of time variant signal samples. See section III.C.3.

Worstell discloses signal samples with signal-dependent noise. *See* section III.C.2

Worstell discloses signal samples with correlated noise. CMU does not dispute that Worstell takes correlated noise into account – and that Drs. Kavcic and Moura were not the first to take correlated noise into account in a modified Viterbi branch metric. Trial Tr. (12/17/12) at 58:18-25; *see also* D-DEMO 12-11: "Q. Was Dr. Kavcic the first person to propose a Viterbi detector that took correlated noise into account? A. I don't believe so.") Of course, it could not, as the title of Worstell is "Modified Viterbi Detector Which Accounts for Correlated Noise." DX-187. Rather, CMU contends that Worstell only discloses a single branch metric function. As explained above, in view of numerous admissions by Dr. McLaughlin, CMU's position is untenable.

3. Worstell Discloses Selecting a Branch Metric Function at a Certain Time Index

See section III.C.2.

4. Worstell Discloses Applying the Selected Function to the Signal Samples to Determine the Metric Values

See section III.C.3.

5. Worstell Discloses Selecting the Branch Metric Function from a Set of Signal-Dependent Branch Metric Functions

See section III.C.2.

IV. THE ASSERTED CLAIMS ARE INVALID FOR OBVIOUSNESS

Obviousness is a question of law based on underlying facts. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). To determine obviousness, a court must consider: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) any relevant secondary considerations, such as commercial success, long felt but unsolved needs, and the failure of others. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966). Under these so-called "*Graham* factors," both asserted claims in this case are obvious as a matter of law.

A. Scope and Content of the Prior Art

The scope and content of the prior art includes the Worstell patent. As discussed above, each of the recited elements of the asserted claims was known in the prior art, and the claimed combination of these elements is found in the Worstell patent. CMU was not the first to conceive of a Viterbi detector for use in magnetic recording that employed a branch metric that took a plurality of signal samples into account as required by the asserted claims. As discussed above, the Worstell patent discloses modified Viterbi detectors that took both correlated noise and signal dependent noise into account through a modified branch metric covered by the asserted claims. Any alleged differences between the subject matter covered by those claims (as interpreted and applied by CMU) and the prior art is insubstantial and was a matter of routine design choice as of the late 1990s.

As acknowledged in the background of the CMU patents, the scope and content of the prior art includes knowledge that Viterbi detectors could be modified to take into account signal dependent noise. The CMU patents acknowledge that the prior art included the Zeng and Lee references provided such modifications:

> It has long been observed that the noise in magnetic recording systems is neither white nor stationary. The nonstationarity of the media noise results from its signal dependent nature. Combating media noise and its signal dependence has thus far been confined to modifying the Euclidian branch metric to account for these effects. Zeng, et al., "Modified Viterbi Algorithm for Jitter-Dominated 1-D.sup.2 Channel," IEEE Trans. Magn., Vol. MAG-28, pp. 2895-97, Sept. 1992, and Lee et al., "Performance Analysis of the Modified maximum Likelihood Sequence Detector in the Presence of Data-Dependent Noise," Proceedings 26th Asilomar Conference, pp. 961-64, Oct. 1992 have derived a branch metric computation method for combating the signal-dependent character of media noise.

P-001 at col. 1:38-51. It was also well known and common in the prior art that the method for taking into account signal dependent noise involved the use of the standard deviation of the noise ("σ"), in particular by using $1/\sigma^2$. Trial Tr. (12/17/12) at 56:1-8. The Zeng and Lee references each utilize $1/\sigma^2$ in their respective Viterbi algorithm equations to account for signal dependent noise. D-Demo 12-8; DX-37 at 962, Eq. 6; DX-38 at 2896.

It is also undisputed that it was known that the standard deviation of the noise ("σ") would vary depending on whether there was a transition or no transition from one state to another. Trial Tr. (12/17/12) at 56:1-8. Accordingly, it is also undisputed that the use of $1/\sigma^2$ in Viterbi algorithm equations results in a set of branch metric functions for each of the branches at a certain time index. Trial Tr. (12/17/12) at 57:6-19, displayed D-DEMO 12-9, 3/22/12 McLaughlin Dep. Tr. at 267:20-268:3 and Dr. Moura Depo. Tr. at 162:22-163:4.

B. Differences Between the Claims and the Prior Art

The CMU patents assert that the difference between the prior art and the CMU patents was that the prior art methods took into account signal dependent noise in the Viterbi detector, but failed to take into consideration correlated noise:

> These methods do not take into consideration the correlation between noise samples in the readback signal. These correlations arise due to noise coloring by front-end equalizers, media noise, media nonlinearities, and magnetoresistive (MR) head nonlinearities. This noise coloring causes significant performance degradation at high recording densities. Thus, there is a need for an adaptive

> correlation-sensitive maximum likelihood sequence detector which derives the maximum likelihood sequence detector (MLSD) without making the usual simplifying assumption that the noise samples are independent random variables.

P-001 at col. 1:57-67. That was incorrect. There is no dispute that the Worstell patent took "into consideration the correlation between noise samples in the readback signal." The title of the Worstell patent is "Modified Viterbi Detector Which Accounts For Correlated Noise." DX-187.

CMU asserts that the "further modified" branch metric disclosed in the Worstell patent only discloses a "constant" scaling factor across all branches and times. Although this is simply incorrect (*see* section III.C.2), even if CMU's contention were correct, the CMU asserted claims would still be rendered obvious by the Worstell patent. Dr. Proakis testified that it would make no sense whatsoever for the sigma to be constant between branches with transitions and no transitions, but if that were the case, it would be obvious to one of ordinary skill in the art to vary the sigma in the Worstell patent from branch to branch. Trial Tr. (12/17/12) at 75:6-77:10.

For the reasons discussed above, there are no differences between the claims and the prior art. But even if there were, any alleged differences between the claimed subject matter and the prior art discussed herein are insubstantial, and would have been considered routine variations on well-known technology back in the 1997 time frame. This is evidenced, for example, by the testimony of Dr. Proakis and Dr. McLaughlin, as well as the prior art acknowledged in the background section of the CMU patents, including the Zeng and Lee references. P-001 at 1:41 – 51; P-002 at 1:41-51; Trial Tr. (12/17/12) at 55:16-56:12.

C. The Level of Ordinary Skill in the Art

As the parties agreed, a person of ordinary skill in the art would have at least a Master's degree in electrical engineering specializing in signal processing and digital communications with at least 2 years of experience in that field or a related industry.

Given the disclosures in the prior art Worstell patent, discussed above, and that CMU (incorrectly) points to one difference between the asserted claims and the prior art, the evidence at trial confirms that a person of ordinary skill would have found the asserted claims to be obvious. *See id.* at 77:13-18; 77:23-78:2. The elements of the asserted claims were all disclosed in the prior art. *Id.* at 68:7-11; 71:19-23. There is no dispute that the Worstell patent accounts for correlated noise, and that Equation 20 of the Worstell patent applies branch metric functions to a plurality of signal samples to determine the metric value corresponding to the branch for which the applied branch metric function was selected, wherein each sample corresponds to a different sampling time instant.

It was well known in the art to account for signal dependent noise in a Viterbi detector through the use of the standard deviation of noise. *Id.* at 57:6-19. There is also no dispute that the Worstell patent further teaches to modify the branch metric equation to take into account signal dependent noise "by multiplying the metrics which correspond to transitions by a fraction which depends on the transition noise standard deviation." DX-187 at 10:54-56. CMU asserts that the standard deviation of noise disclosed in the Worstell patent is a constant. That is incorrect; the standard deviation of noise as disclosed in the Worstell patent does vary. Even if CMU were correct, however, it was well known in the art to vary the standard deviation of noise multiplier in the branch metric equations. Trial Tr. (12/17/12) at 57:6-19.

Furthermore, a person of ordinary skill would have recognized that the transition noise would be signal-dependent. A person of ordinary skill would have recognized the benefit of taking into account both signal dependent noise and correlated noise in the Viterbi detector, as taught by the Worstell patent. Thus, the limitations recited in the asserted claims are obvious

combinations of known elements that pose no technical barriers to implement and lead to predictable results. *See KSR*, 550 U.S. at 421.

D. No Secondary Considerations Can Rebut the Obviousness Showing

A patentee may rebut an obviousness showing by pointing to "secondary considerations" of non-obviousness, such as commercial success of the patented invention, failure of others to create the patented invention, or showing that the patented invention filled a long-felt and unsolved need. *See Graham*, 383 U.S. at 17-18. In this case, there are no secondary considerations to rebut the obviousness of the asserted '839 and '180 claims. For example, there was no commercial success for these patents – in fact, the patents were never commercially used at all. DX-214 ("[w]e are not aware of anyone utilizing the claims in the Kavcic-Moura patent"); 12/5/2012 Wooldridge Tr. at 138:13-142:9; 177:24-178:13. There was also no showing that Marvell's sales of the accused chips could be attributed to the patented invention even if infringement were found. The evidence shows that various other factors drove customer demand for the accused chips. Trial Tr. (12/13/12) at 154:10-155:3.

There also was no failure by others to devise the systems or methods claimed by these patents, nor did these patents fill any long-felt and unsolved need. 12/5/2012 Wooldridge Tr. at 178:2-13. To the contrary, numerous prior art references had ***already*** solved the problem of media noise, in a variety of ways separate and apart from the asserted patents. DX-37; DX-38; and DX-187.

CMU improperly relies on an email written by Glen Worstell, the named inventor for the Worstell patent, as evidence of non-obviousness. After reviewing the CMU invention disclosure, Mr. Worstell stated that "this invention is related but goes beyond my work and is probably more interesting." Tr. (12/17/12) at 97:16-98:25, citing P-161. But this email proves little. There were no ***patent claims*** drafted in the invention disclosure, only complex equations

involving covariance matrices. It is impossible for CMU to draw any nexus whatsoever between Mr. Worstell's statement and any ***claims*** in the CMU patents, let alone claim 4 of the '839 patent and claim 2 of the '180 patent (and not, for example the Group II claims this Court already summarily ruled were not infringed).

Finally, CMU relies on evidence of alleged copying in support of its contentions that the patented claims are nonobvious. But CMU has failed to establish any "nexus between the copying and the novel aspects of the claimed invention" which "must exist for evidence of copying to be given significant weight in an obviousness analysis." *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012). At trial, CMU presented technical documents with various references to Dr. Kavcic's name (*see* P-196, P-227, P-279, P-280) without explaining the technical details of these documents or presenting any particularized evidence that Marvell copied the patented technology in any of its accused chip or simulator designs. *See* 12/3/12 McLaughlin Tr. 56:18-57:3 ("Kavcic model"); 57:4-15 ("simplified Kavcic PP"); 57:16-58: 15 ("develop sub-optimal media noise detector based on Kavcic model"); 65:14-66:9 ("Kavcic PP. PP means, post processor"); 71:13-72:2 ("sub-optimal version of Kavcic's detector"); 72:10-73:12 ("Kavcic PP" file name). Mere references to "Kavcic" do not establish that Marvell intentionally copied any aspect of the asserted claims. Indeed, if anything, the repeated references to "sub-optimal," "simplified," and "PP" (meaning "post processor") distinguish the complex Kavcic model from the solutions that Marvell was working on and ultimately incorporated into its commercial chips. Without the required nexus to the asserted claims, any evidence regarding alleged copying is irrelevant to the issue of obviousness.

Thus, CMU has failed to identify any secondary considerations that would rebut the overwhelming evidence of obviousness here, and judgment as a matter of law is warranted for this additional reason.

V. CONCLUSION

For the foregoing reasons, Marvell respectfully requests that the Court grant its Motion for Judgment as a Matter of Law on Invalidity.

Dated: December 19, 2012

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on December 19, 2012, the foregoing was filed electronically on ECF. I also hereby certify that on December 19, 2012, this filing will also be served on counsel for CMU by electronic mail.

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